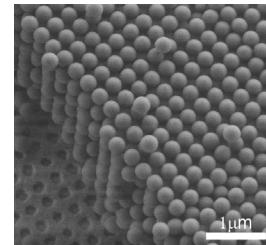


Control of colloidal crystal structure and orientation on patterned substrates by electrophoresis

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We present a method of growing colloidal crystals with various symmetries and orientations on millimeter length scales. These crystals are further used as templates for photonic-crystal fabrication. Using laser-interference lithography, we produce patterns on electrodes. The patterns have sub-micron periodicities and cover large areas on the electrodes. Charged colloids driven to the electrodes are positioned according to the pattern symmetry, which pre-determines orientation and symmetry of the grown crystal.^[1] We can fabricate face-centered cubic structures with (111), (100) and (110) planes parallel to the electrode surface and a body-centered cubic structure (see Figure). The crystal thickness depends on the deposition time. Therefore, we also demonstrate 2D colloidal structures with hexagonal and tetragonal symmetries. Formation of crystals with low symmetries can be achieved performing layer-by-layer deposition of colloids of different sizes.



[1] N.V. Dziomkina, M.A. Hempenius, G.J. Vancso, *Advanced Materials*, **17**, 237 (2005).